Table 1. Parameters of Ceramicrete Binder

Property	Range of values	Remarks
Density of binders	1.7-2.0 g/cc	May be enhanced or reduced by selecting aggregates and process additives.
Porosity (Immersion method)	Open porosity is close to zero. Some close pores exist.	Intentional porosity may be introduced.
Compressive strength with aggregates (ASTM C-39)	3,500 psi for Ceramicrete binder alone. 8000-12000 psi for Ceramicrete with aggregates; lower for ferroceramicrete aggregate	Ash provides the highest strength.
Flexural strength (ASTM C-293)	900-1600 psi for composite with ash and appropriate minerals	The highest strength is obtained in fiber-reinforced Ceramicrete.
Fracture toughness (Micro-indentation)	0.3-1MPa.$m^{1/2}$	Toughness can be enhanced with fibers, whiskers and coarse particles.
Bond shear strength (ASTM C-882)	>3,000 psi on concrete, steel and most common metals, rocks.	Higher strength is obtained on rougher surfaces.
Aqueous stability	Stable in mild acid to mild base (pH of 3.0-11)	More acid-resistance can be obtained by modifying the composition.
Thermal expansion coefficient	Approximately $10^{-5}/^{o}C$	Varies with aggregate.
Fire resistance (ASTM E-84, and E-119)	Zero flame spread. Performance in hydrocarbon test is also excellent.	Even thin coatings (20-mil-thick) show excellent performance.
Thermal stability	The binder gives away bound water at 120^{o}C, but the dehydrated binder is refractory and stable.	Highest temperature before softening occurs is at 1100 ^{o}C if silica-based extenders are added. The binder by itself is stable at least till 1500^{o}C

Property	Range of values	Remarks
Radiation stability	Stable in beta, gamma radiation. Exposure to 10^8 rads of gamma has shown no deterioration.	Gas generation due to splitting of bound water is minimal and has not shown any pressurization of containers.
Corrosion resistance (ASTM B-117)	Excellent. No corrosion or osmotic blistering even after exposure to salt fog spray for 1,000 h.	Coatings form two layers. Dual protection system. The chemical layer immediate to the substrate metal is very stable and provides passivation. The top layer protects the passivation layer from external attacks.
Neutron absorption	Composition can be devised to absorb 50-80% neutron-flux in one-foot thickness.	Used as a nuclear shield.